CLAIMS

1. A liquid heating assembly comprising:

a heat-conductive displaceable element; and

a liquid heating enclosure defining a liquid heating volume including a primary liquid heating volume portion and a secondary liquid heating volume portion, separated by said heat-conductive displaceable element, said primary liquid heating volume portion including a heat exchanger for directly heating liquid in said primary liquid heating volume portion and for indirectly heating liquid in said secondary liquid heating volume portion via said heat-conductive displacement element.

2. A liquid heating assembly according to claim 1 and wherein said heat-conductive displaceable element comprises a resilient, flexible element.

3. A liquid heating assembly according to claim 1 or claim 2 and wherein said heat-conductive displaceable element forms at least a wall both of said primary liquid heating volume portion and of said secondary liquid heating volume portion.

4. A liquid heating assembly according to any of the preceding claims and wherein at least said liquid heating enclosure defines a primary liquid flow pathway in said primary liquid heating volume portion and a secondary liquid flow pathway in said secondary liquid heating volume portion, said secondary liquid flow pathway supplying liquid to said primary liquid flow pathway.

5. A liquid heating assembly according to any of the preceding claims and wherein said primary liquid heating volume portion is formed of a relatively rigid, highly heat conductive material.

6. A liquid heating assembly according to claim 5 and wherein said secondary liquid heating volume portion is formed of a material which is less rigid and less heat conductive than said material forming said primary liquid heating volume portion.

7. A liquid heating assembly according to claim 4 and wherein at least said primary liquid flow pathway is defined by said liquid heating enclosure and by said heat-conductive displacement element.

8. A liquid heating assembly according to any of the preceding claims and wherein at least said liquid heating enclosure defines an at least partially turbulent flow primary liquid flow pathway in said primary liquid heating volume portion and an at least partially turbulent flow secondary liquid flow pathway in said secondary liquid heating volume portion, said at least partially turbulent flow secondary liquid flow pathway supplying liquid to said at least partially turbulent flow primary liquid flow pathway.

9. A liquid heating assembly according to any of the preceding claims and wherein said primary liquid heating volume portion is formed at least partially of a metal material, which is relatively highly heat conductive and said secondary liquid heating volume portion is formed at least partially of a plastic material, which is relatively heat insulative, separated by said heat-conductive displaceable element, formed of a material which is less heat conductive than said metal material.

10. A liquid heating assembly according to claim 9 and wherein said heat-conductive displaceable element is formed of a material which is more heat conductive than said plastic material.

11. A liquid heating assembly according to any of the preceding claims and wherein said heat-conductive displaceable element is apertured to permit liquid communication from said secondary liquid heating volume portion to said primary liquid heating volume portion.

12. A liquid heating assembly according to any of the preceding claims and wherein said secondary liquid heating volume portion includes at least one displaceable outer wall portion providing freeze protection by virtue of its displaceability.

13. A liquid heating assembly according to claim 12 and wherein said heat-conductive displaceable element is operative to be displaced into said secondary liquid heating volume portion upon freezing of liquid inside said primary liquid heating volume portion.

14. A liquid heating assembly according to any of the preceding claims and wherein said heat-conductive displaceable element is an intervening liquid impermeable diaphragm.

15. A liquid heating assembly according to any of the preceding claims and wherein said primary liquid heating volume portion is a first conduit element and said secondary liquid heating volume portion is a second conduit element.

16. A liquid heating assembly according to claim 15 and wherein said heat exchanger is defined by said first conduit element and said second conduit element.

17. A vehicle comprising:

a vehicle chassis including a drive train;

a vehicle body including at least one vehicle surface which requires washing;

a vehicle washing liquid reservoir;

a vehicle washing liquid discharge assembly;

a vehicle surface washer assembly operative to employ said vehicle washing liquid discharge assembly and a washing liquid from said vehicle washing liquid reservoir for washing said at least one vehicle surface which requires washing; ,

a liquid heating assembly operative to employ said vehicle washing liquid discharge assembly and said washing liquid from said vehicle washing liquid reservoir for providing a spray of heated liquid onto said at least one vehicle surface which requires washing, said liquid heating assembly comprising:

a heat-conductive displaceable element; and

a liquid heating enclosure defining a liquid heating volume including a primary liquid heating volume portion and a secondary liquid heating volume portion, separated by said heat-conductive displaceable element, said primary liquid heating volume portion including a heat exchanger for directly heating liquid in said primary liquid heating volume portion and for indirectly heating liquid in said secondary liquid heating volume portion via said heat-conductive displacement element.

18. A vehicle according to claim 17 and wherein said heat-conductive displaceable element comprises a resilient, flexible element.

19. A vehicle according to claim 17 or claim 18 and wherein said heat-conductive displaceable element forms at least a wall both of said primary liquid heating volume portion and of said secondary liquid heating volume portion.

20. A vehicle according to any of the preceding claims 17 – 19 and wherein at least said liquid heating enclosure defines a primary liquid flow pathway in said primary liquid heating volume portion and a secondary liquid flow pathway in said secondary liquid heating volume portion, said secondary liquid flow pathway supplying liquid to said primary liquid flow pathway.

21. A vehicle according to any of the preceding claims 17 – 20 and wherein said primary liquid heating volume portion is formed of a relatively rigid, highly heat conductive material.

22. A vehicle according to claim 21 and wherein said secondary liquid heating volume portion is formed of a material which is less rigid and less heat conductive than said material forming said primary liquid heating volume portion.

23. A vehicle according to claim 20 and wherein at least said primary liquid flow pathway is defined by said liquid heating enclosure and by said heat-conductive displacement element.

24. A vehicle according to any of the preceding claims 17 – 23 and wherein at least said liquid heating enclosure defines an at least partially turbulent flow primary liquid flow pathway in said primary liquid heating volume portion and an at least partially turbulent flow secondary liquid flow pathway in said secondary liquid heating volume portion, said least partially turbulent flow secondary liquid flow pathway supplying liquid to said least partially turbulent flow primary liquid flow pathway.

25. A vehicle according to any of the preceding claims 17 – 24 and wherein said primary liquid heating volume portion is formed at least partially of a metal material, which is relatively highly heat conductive and said secondary liquid heating volume portion is formed at least partially of a plastic material, which is relatively heat insulative, separated by said heat-conductive displaceable element, formed of a material which is less heat conductive than said metal material.

26. A vehicle according to claim 25 and wherein said heat-conductive displaceable element is formed of a material which is more heat conductive than said plastic material.

27. A vehicle according to any of the preceding claims 17 – 26 and wherein said heat-conductive displaceable element is apertured to permit liquid communication from said secondary liquid heating volume portion to said primary liquid heating volume portion.

28. A vehicle according to any of the preceding claims 17 – 27 and wherein said secondary liquid heating volume portion includes at least one displaceable outer wall portion providing freeze protection by virtue of its displaceability.

29. A vehicle according to claim 28 and wherein said heat-conductive displaceable element is operative to be displaced into said secondary liquid heating volume portion upon freezing of liquid inside said primary liquid heating volume portion.

30. A vehicle according to any of the preceding claims 17 – 29 and wherein said at least one vehicle surface which requires washing includes at least one of the following surfaces:

a front vehicle windshield surface, a back vehicle windshield surface, side vehicle windows, a vehicle headlight surface, a vehicle rear light surface, a vehicle radar antenna surface and a vehicle exterior mirror surface.

31. A vehicle according to any of the preceding claims 17 – 30 and wherein said heat-conductive displaceable element is an intervening liquid impermeable diaphragm.

32. A vehicle according to any of the preceding claims 17 – 31 and wherein said primary liquid heating volume portion is a first conduit element and said secondary liquid heating volume portion is a second conduit element.

33. A vehicle according to claim 32 and wherein said heat exchanger is defined by said first conduit element and said second conduit element.

34. A vehicle according to any of the preceding claims 17 – 33 and wherein user activation activates said spray of heated liquid onto said at least one vehicle surface which requires washing.

35. A vehicle according to any of the preceding claims 17 – 34 and wherein automatic activation activates said spray of heated liquid onto said at least one vehicle surface which requires washing.

36. A vehicle according to claim 35 and wherein said automatic activation is provided by an AGC actuation signal.

37. A vehicle according to any of the preceding claims 17 – 36 and wherein said liquid heating assembly is operative to employ said vehicle washing liquid discharge assembly and said washing liquid from said vehicle washing liquid reservoir

for providing a spray of liquid onto a vehicle windshield surface and a vehicle radar antenna surface.

38. A vehicle according to claim 37 and also comprising a normally-open valve interconnecting vehicle windshield sprayers of said vehicle windshield surface to said vehicle washing liquid discharge assembly and being operative, when open, to bypass vehicle radar antenna sprayers of said vehicle radar antenna surface.

39. A vehicle according to claim 38 and also comprising a flow restrictor, restricting liquid flow to said vehicle radar antenna sprayers to ensure liquid is supplied to said vehicle windshield sprayers when said normally-open valve is open.

40. A vehicle comprising:

a vehicle chassis including a drive train;

a vehicle body including at least one vehicle surface which requires washing;

a vehicle washing liquid reservoir;

a vehicle washing liquid discharge assembly;

a vehicle surface washer assembly operative to employ said vehicle washing liquid discharge assembly and a washing liquid from said vehicle washing liquid reservoir for washing said at least one vehicle surface which requires washing;

a liquid heating assembly operative to employ said vehicle washing liquid discharge assembly and said washing liquid from said vehicle washing liquid reservoir for providing a spray of heated liquid onto said at least one surface which requires washing; and

a normally closed automatically operative valve interconnecting said vehicle washing liquid reservoir to said vehicle washing liquid discharge assembly and being operative, when open, to bypass said liquid heating assembly.

41. A vehicle according to claim 40 and also comprising a vehicle pump connected upstream of said at least one vehicle washing liquid reservoir and downstream of said normally closed automatically operative valve.

42. A vehicle according to claim 40 or claim 41 and wherein said liquid heating assembly comprises:

a heat-conductive displaceable element; and

a liquid heating enclosure defining a liquid heating volume including a primary liquid heating volume portion and a secondary liquid heating volume portion, separated by said heat-conductive displaceable element, said primary liquid heating volume portion including a heat exchanger for directly heating liquid in said primary liquid heating volume portion and for indirectly heating liquid in said secondary liquid heating volume portion via said heat-conductive displacement element.

43. A vehicle according to claim 42 and wherein said heat-conductive displaceable element comprises a resilient, flexible element.

44. A vehicle according to claim 42 or claim 43 and wherein said heat-conductive displaceable element forms at least a wall both of said primary liquid heating volume portion and of said secondary liquid heating volume portion.

45. A vehicle according to any of the preceding claims 42 – 44 wherein at least said liquid heating enclosure defines a primary liquid flow pathway in said primary liquid heating volume portion and a secondary liquid flow pathway in said secondary liquid heating volume portion, said secondary liquid flow pathway supplying liquid to said primary liquid flow pathway.

46. A vehicle according to any of the preceding claims 42 – 45 and wherein said primary liquid heating volume portion is formed of a relatively rigid, highly heat conductive material.

47. A vehicle according to claim 46 and wherein said secondary liquid heating volume portion is formed of a material which is less rigid and less heat conductive than said material forming said primary liquid heating volume portion.

48. A vehicle according to claim 45 and wherein at least said primary liquid flow pathway is defined by said liquid heating enclosure and by said heat-conductive displacement element.

49. A vehicle according to any of the preceding claims 42 – 48 and wherein at least said liquid heating enclosure defines an at least partially turbulent flow primary liquid flow pathway in said primary liquid heating volume portion and an at least partially turbulent flow secondary liquid flow pathway in said secondary liquid heating volume portion, said at least partially turbulent flow secondary liquid flow pathway supplying liquid to said at least partially turbulent flow primary liquid flow pathway.

50. A vehicle according to any of the preceding claims 42 – 49 and wherein said primary liquid heating volume portion is formed at least partially of a metal material, which is relatively highly heat conductive and said secondary liquid heating volume portion is formed at least partially of a plastic material, which is relatively heat insulative, separated by said heat-conductive displaceable element, formed of a material which is less heat conductive than said metal material.

51. A vehicle according to claim 50 and wherein said heat-conductive displaceable element is formed of a material which is more heat conductive than said plastic material.

52. A vehicle according to any of the preceding claims 42 – 51 and wherein said heat-conductive displaceable element is apertured to permit liquid communication from said secondary liquid heating volume portion to said primary liquid heating volume portion.

53. A vehicle according to any of the preceding claims 42 – 52 and wherein said secondary liquid heating volume portion includes at least one displaceable outer wall portion providing freeze protection by virtue of its displaceability.

54. A vehicle according to claim 53 and wherein said heat-conductive displaceable element is operative to be displaced into said secondary liquid heating volume portion upon freezing of liquid inside said primary liquid heating volume portion.

55. A vehicle according to any of the preceding claims 42 – 54 and wherein said at least one vehicle surface which requires washing includes at least one of the following surfaces:

a front vehicle windshield surface, a back vehicle windshield surface, a side vehicle window, a vehicle headlight surface, a vehicle rear light surface, a vehicle radar antenna surface and a vehicle exterior mirror surface.

56. A vehicle according to any of the preceding claims 42 – 55 and wherein said heat-conductive displaceable element is an intervening liquid impermeable diaphragm.

57. A vehicle according to any of the preceding claims 42 – 56 and wherein said primary liquid heating volume portion is a first conduit element and said secondary liquid heating volume portion is a second conduit element.

58. A vehicle according to claim 57 and wherein said heat exchanger is defined by said first conduit element and said second conduit element.

59. A vehicle according to any of the preceding claims 40 – 58 and wherein said normally closed automatically operative valve is a differential pressure responsive one-way valve.

60. A vehicle according to any of the preceding claims 40 – 59 and wherein user activation activates said spray of heated liquid onto said at least one vehicle surface which requires washing.

61. A vehicle according to any of the preceding claims 40 – 60 and wherein automatic activation activates said spray of heated liquid onto said at least one vehicle surface which requires washing.

62. A vehicle according to claim 61 and wherein said automatic activation is provided by an AGC actuation signal.

63. A vehicle according to any of the preceding claims 40 – 62 and wherein said liquid heating assembly is operative to employ said vehicle washing liquid discharge assembly and said washing liquid from said vehicle washing liquid reservoir for providing a spray of liquid onto a vehicle windshield surface and a vehicle radar antenna surface.

64. A vehicle according to claim 63 and also comprising a normally-open valve interconnecting vehicle windshield sprayers of said vehicle windshield surface to said vehicle washing liquid discharge assembly and being operative, when open, to bypass vehicle radar antenna sprayers of said vehicle radar antenna surface.

65. A vehicle according to claim 64 and also comprising a flow restrictor, restricting liquid flow to said vehicle radar antenna sprayers to ensure liquid is supplied to said vehicle windshield sprayers when said normally-open valve is open.

66. A liquid heating method comprising:

providing a liquid heating enclosure defining a liquid heating volume including a primary liquid heating volume portion and a secondary liquid heating volume portion, separated by a heat-conductive displaceable element; and

directly heating liquid in said primary liquid heating volume portion, thereby indirectly heating liquid in said secondary liquid heating volume portion via said heat-conductive displacement element.

67. A liquid heating method according to claim 66 and wherein said heat-conductive displaceable element is resiliently and flexibly displaceable.

68. A liquid heating method according to claim 66 or claim 67 and wherein said heat-conductive displaceable element separates said primary liquid heating volume portion and said secondary liquid heating volume portion.

69. A liquid heating method according to any of the preceding claims 66 – 68 and wherein liquid flows into a primary liquid flow pathway in said primary liquid heating volume portion from a secondary liquid flow pathway in said secondary liquid heating volume portion.

70. A liquid heating method according to any of the preceding claims 66 – 69 and wherein at least said liquid flows in at least partially turbulent flow primary liquid flow through said primary liquid heating volume portion following flowing in at least partially turbulent flow secondary liquid flow through said secondary liquid heating volume portion.

71. A liquid heating method according to any of the preceding claims 66 – 70 and wherein said liquid flows via an aperture formed in said heat-conductive displaceable element to permit liquid communication from said secondary liquid heating volume portion to said primary liquid heating volume portion.

72. A liquid heating method according to any of the preceding claims 66 – 71 and wherein at least one displaceable outer wall portion of said secondary liquid heating volume portion is displaced into said secondary liquid heating volume portion upon freezing of liquid inside said primary liquid heating volume portion.

73. A vehicle operation method comprising:

providing a vehicle including at least one vehicle surface which requires washing; and

washing said at least one vehicle surface which requires washing by supplying heated liquid from a reservoir as a spray of heated liquid onto said at least one surface which requires washing including causing liquid from said reservoir to be

directly heated in a primary liquid heating volume portion and to be indirectly heated in a secondary liquid heating volume portion via a heat-conductive element separating said primary and secondary liquid heating volume portions.

74. A vehicle operation method according to claim 73 and wherein said primary and secondary liquid heating volume portions are defined by a liquid heating enclosure, and wherein said primary liquid heating volume portion includes a heat exchanger for directly heating said liquid in said primary liquid heating volume portion and for indirectly heating said liquid in said secondary liquid heating volume portion via said heat-conductive displacement element.

75. A vehicle operation method according to claim 73 or claim 74 and wherein said heat-conductive displaceable element is resiliently and flexibly displaceable.

76. A vehicle operation method according to any of the preceding claims 73 – 75 and wherein said heat-conductive displaceable element separates said primary liquid heating volume portion and said secondary liquid heating volume portion.

77. A vehicle operation method according to any of the preceding claims 73 – 76 and wherein said liquid flows into a primary liquid flow pathway in said primary liquid heating volume portion from a secondary liquid flow pathway in said secondary liquid heating volume portion.

78. A vehicle operation method according to any of the preceding claims 73 – 77 and wherein at least said liquid flows in at least partially turbulent flow primary liquid flow through said primary liquid heating volume portion following flowing in at least partially turbulent flow secondary liquid flow through said secondary liquid heating volume portion.

79. A vehicle operation method according to any of the preceding claims 73 – 78 and wherein at least one displaceable outer wall portion of said secondary liquid

heating volume portion is displaced into said secondary liquid heating volume portion upon freezing of liquid inside said primary liquid heating volume portion.

80. A vehicle operation method according to any of the preceding claims 73 – 79 and wherein said washing includes an heated initial spray cycle.

81. A vehicle operation method according to claim 80 and wherein said indirectly heating liquid in said secondary liquid heating volume portion during a relatively long time duration after initial operation of a motor of said vehicle causes said initial spray cycle to be relatively longer than when said indirectly heating liquid in said secondary liquid heating volume portion is during a relatively short time duration after said initial operation of said motor of said vehicle.

82. A vehicle operation method according to claim 80 and wherein said supplying heated liquid onto said at least one surface is nearly instantaneous when said indirectly heating liquid in said secondary liquid heating volume portion is for a relatively short time duration after said initial operation of said motor of said vehicle.

83. A vehicle operation method according to claim 80 and wherein said indirectly heating liquid in said secondary liquid heating volume portion during a relatively long time duration after a previous spray cycle causes said initial spray cycle to be relatively longer than when said indirectly heating liquid in said secondary liquid heating volume portion is during a relatively short time duration after said previous spray cycle.

84. A vehicle operation method according to claim 80 and wherein said supplying heated liquid onto said at least one surface is nearly instantaneous when said indirectly heating liquid in said secondary liquid heating volume portion is for a relatively short time duration after a previous spray cycle.

85. A vehicle operation method comprising:

providing a vehicle including at least one vehicle surface which requires washing; and

washing said at least one vehicle surface which requires washing by at least one of:

supplying heated liquid from a liquid reservoir via a liquid heating assembly as a spray of heated liquid onto said at least one surface which requires washing; and

supplying unheated liquid from said liquid reservoir via a normally closed automatically operative valve which, when open, bypasses said liquid heating assembly.

86. A vehicle operation method according to claim 85 and wherein a vehicle pump connects upstream of said liquid reservoir and downstream of said normally closed automatically operative valve.

87. A vehicle operation method according to claim 85 or claim 86 and also comprising:

providing a vehicle including said at least one vehicle surface which requires washing; and

washing said at least one vehicle surface which requires washing by supplying heated liquid from said liquid reservoir as a spray of heated liquid onto said at least one surface which requires washing including causing liquid from said liquid reservoir to be directly heated in a primary liquid heating volume portion and to be indirectly heated in a secondary liquid heating volume portion via a heat-conductive element separating said primary and secondary liquid heating volume portions.

88. A vehicle operation method according to claim 87 and wherein said primary and secondary liquid heating volume portions are defined by a liquid heating enclosure, and wherein said primary liquid heating volume portion includes a heat exchanger for directly heating said liquid in said primary liquid heating volume portion and for indirectly heating said liquid in said secondary liquid heating volume portion via said heat-conductive displacement element.

89. A vehicle operation method according to any of the preceding claims 87 – 88 and wherein said heat-conductive displaceable element is resiliently and flexibly displaceable.

90. A vehicle operation method according to any of the preceding claims 87 – 89 and wherein said heat-conductive displaceable element separates said primary liquid heating volume portion and said secondary liquid heating volume portion.

91. A vehicle operation method according to any of the preceding claims 87 – 90 and wherein said liquid flows into a primary liquid flow pathway in said primary liquid heating volume portion from a secondary liquid flow pathway in said secondary liquid heating volume portion.

92. A vehicle operation method according to any of the preceding claims 87 – 91 and wherein at least said liquid flows in at least partially turbulent flow primary liquid flow through said primary liquid heating volume portion following flowing in at least partially turbulent flow secondary liquid flow through said secondary liquid heating volume portion.

93. A vehicle operation method according to any of the preceding claims 87 – 92 and wherein said liquid flows via an aperture formed in said heat-conductive displaceable element to permit liquid communication from said secondary liquid heating volume portion to said primary liquid heating volume portion.

94. A vehicle operation method according to any of the preceding claims 87 – 93 and wherein at least one displaceable outer wall portion of said secondary liquid heating volume portion is displaced into said secondary liquid heating volume portion upon freezing of liquid inside said primary liquid heating volume portion.

95. A vehicle operation method according to any of the preceding claims 85 – 94 and wherein said washing includes an heated initial spray cycle.

96. A vehicle operation method according to claim 95 and wherein said indirectly heating liquid in said secondary liquid heating volume portion during a relatively long time duration after initial operation of a motor of said vehicle causes said initial spray cycle to be relatively longer than when said indirectly heating liquid in said secondary liquid heating volume portion is during a relatively short time duration after said initial operation of said motor of said vehicle.

97. A vehicle operation method according to claim 95 and wherein said supplying heated liquid onto said at least one surface is nearly instantaneous when said indirectly heating liquid in said secondary liquid heating volume portion is for a relatively short time duration after said initial operation of said motor of said vehicle.

98. A vehicle operation method according to claim 95 and wherein said indirectly heating liquid in said secondary liquid heating volume portion during a relatively long time duration after a previous spray cycle causes said initial spray cycle to be relatively longer than when said indirectly heating liquid in said secondary liquid heating volume portion is during a relatively short time duration after said previous spray cycle.

99. A vehicle operation method according to claim 95 and wherein said supplying heated liquid onto said at least one surface is nearly instantaneous when said indirectly heating liquid in said secondary liquid heating volume portion is for a relatively short time duration after a previous spray cycle.

100. A heated liquid discharge system comprising:

a main assembly which provides liquid heating and includes electrical and liquid flow control functionalities;

a liquid inflow conduit supplying liquid from a liquid reservoir to said main assembly; and

a liquid outflow conduit supplying liquid to at least one sprayer located at at least one location on a motor vehicle,

said main assembly comprising a liquid heating chamber communicating with said liquid inflow conduit and said liquid outflow conduit and being formed with a liquid drain aperture located on a side thereof which permits draining of liquid from said liquid heating chamber generally down to a level of said liquid drain aperture.

101. A heated liquid discharge system according to claim 100 and wherein said draining takes place when a vehicle pump supplying liquid to said liquid inflow conduit is not in operation.

102. A heated liquid discharge system according to claim 100 or claim 101 and wherein said at least one location includes at least one of the following locations: front vehicle windshield, back vehicle windshield, side vehicle windows, vehicle headlights, vehicle rear lights and vehicle exterior mirrors.

103. A heated liquid discharge system according to any of the preceding claims 100 - 102 and wherein a vehicle operator actuation switch is electrically coupled to said main assembly.

104. A heated liquid discharge system according to any of the preceding claims 100 - 103 and wherein said main assembly is connected to a vehicle computer.

105. A heated liquid discharge system according to any of the preceding claims 100 - 104 and wherein said main assembly is connected to a vehicle ignition switch.

106. A heated liquid discharge system according to any of the preceding claims 100 - 105 and wherein said main assembly comprises a principal housing portion and a cover housing portion.

107. A heated liquid discharge system according to claim 106 and wherein said principal housing portion defines a generally circular cylindrical liquid heating

chamber accommodating volume in a major portion of which is disposed a liquid heating assembly including said liquid heating chamber.

108. A heated liquid discharge system according to any of claims 100 - 107 and wherein said liquid heating chamber comprises a generally circular cylindrical outer sleeve.

109. A heated liquid discharge system according to claim 107 and wherein said liquid heating assembly comprises a plurality of heating elements located within said liquid heating chamber.

110. A heated liquid discharge system according to claim 109 and wherein electrical characteristics of individual ones of said plurality of heating elements are different from each other.

111. A heated liquid discharge system according to claim 107 and wherein said principal housing portion defines a liquid inlet channel and a heated liquid outlet channel, both communicating with said liquid heating chamber accommodating volume and respectively communicating with said liquid inflow conduit and said liquid outflow conduit.

112. A heated liquid discharge system according to claim 111 and wherein said principal housing portion also defines a heated liquid temperature sensor mounting aperture which communicates with said liquid heating chamber accommodating volume.

113. A heated liquid discharge system according to claim 112 and wherein liquid supplied to said liquid heating chamber accommodating volume via said liquid inlet channel enters said liquid heating chamber via at least two liquid inlet apertures formed in said liquid heating chamber including a first aperture located near a base of said liquid heating chamber and a second aperture located at an opposite side of said

liquid heating chamber from said first aperture and near a middle of a height of said liquid heating chamber.

114. A heated liquid discharge system according to claim 113 and wherein during operation of said vehicle pump supplying liquid to said liquid inflow conduit a level of said liquid exceeds said height of said liquid heating chamber and fills said liquid heating chamber accommodating volume.

115. A heated liquid discharge system according to claim 114 and wherein said liquid drain aperture is located on a side of said liquid heating chamber just below the top thereof, which permits draining of said liquid from said liquid heating chamber accommodating volume generally only down to said level of said liquid drain aperture when said vehicle pump is not in operation.

116. A heated liquid discharge system according to claim 115 and wherein said liquid from said liquid reservoir is supplied by said vehicle pump via said liquid inlet conduit via a liquid inlet pathway portion of a liquid connector assembly, which also defines a liquid outlet pathway portion.

117. A heated liquid discharge system according to claim 116 and wherein said liquid connector assembly defines a differential pressure bypass pathway portion, which is controlled by a one-way valve and which permits liquid flow from said liquid inlet pathway portion to said liquid outlet pathway portion when a pressure differential thereacross reaches a predetermined threshold, which indicates the existence of a blockage in a liquid path through said liquid heating chamber accommodating volume.

118. A heated liquid discharge system according to claim 117 and wherein said liquid inlet pathway portion comprises a leaky one way valve which permits supply of liquid under pressure to said liquid heating chamber accommodating volume but restricts backflow therethrough to a relatively slow rate.

119. A heated liquid discharge system according to claim 118 and wherein said liquid passes through said liquid inlet channel, fills said liquid heating chamber accommodating volume and flows into said liquid heating chamber via said first and second apertures.

120. A heated liquid discharge system according to claim 119 and wherein said liquid is heated in said liquid heating chamber and a temperature of said liquid or of air overlying said liquid, depending on the liquid level of said liquid, is sensed by at least one temperature sensor.

121. A heated liquid discharge system according to claim 120 and wherein said at least one temperature sensor is mounted onto a printed circuit board which is mounted within said principal housing portion and located outside of said liquid heating chamber accommodating volume.

122. A heated liquid discharge system according to any of the preceding claims 100 - 121 and also comprising control circuitry, for operation of said main assembly, which is connected to said at least one temperature sensor.

123. A heated liquid discharge system according to any of the preceding claims 100 - 122 and also comprising an overheating cut-off fuse for shutting off electrical power to at least part of said main assembly in the event of overheating of said liquid heating chamber.

124. A heated liquid discharge system according to claim 123 and wherein said fuse is formed with an undersurface of a resilient material and is retained in tight thermal engagement with the underside of a base of said liquid heating element.

125. A heated liquid discharge system according to any of the preceding claims 100 - 124 and wherein said liquid drain aperture together with a leaky one-way valve provides both overheating and anti-freezing protection for said main assembly.

126. A heated liquid discharge system according to claim 125 and wherein when said liquid is not being pumped into said liquid heating chamber, said liquid tends to drain slowly from said liquid heating chamber via said leaky one-way valve until a level of liquid in said liquid heating chamber reaches said level of said liquid drain aperture, at which point air, rather than liquid is drawn into said liquid outflow conduit, effectively terminating drainage and retaining liquid inside said liquid heating chamber accommodating volume generally at said level of said liquid drain aperture.

127. A heated liquid discharge system according to claim 126 and wherein retention of liquid inside said liquid heating chamber at a level generally not lower than that of said liquid drain aperture ensures that said level of liquid in said liquid heating chamber at least covers most of said heating elements located therein, ensuring rapid heating of said liquid and avoiding burning out of said heating elements due to lack of said liquid in the vicinity thereof and retention of said liquid inside said liquid heating chamber at a level no higher than that of said liquid drain aperture ensures that sufficient freezing expansion volume is provided so that when the vehicle is not being operated and is in a freezing environment, freezing of said liquid therein does not cause cracking of said liquid heating chamber.

128. A heated liquid discharge system comprising:

a main assembly which provides liquid heating and includes electrical and liquid flow control functionalities;

a liquid inflow conduit supplying liquid from a liquid reservoir to said main assembly; and

a liquid outflow conduit supplying liquid to at least one sprayer located at at least one location on a motor vehicle,

said liquid inflow conduit having connected in series therewith a leaky one-way valve which permits limited backflow of liquid from said main assembly to said reservoir.

129. A heated liquid discharge system according to claim 128 and wherein said main assembly comprises a liquid heating chamber communicating with said liquid

inflow conduit and said liquid outflow conduit and being formed with a liquid drain aperture located on a side thereof which permits draining of liquid from said liquid heating chamber generally down to level of said liquid drain aperture via said leaky one-way valve.

130. A heated liquid discharge system according to claim 129 and wherein said draining takes place when a vehicle pump supplying liquid to said liquid inflow conduit is not in operation.

131. A heated liquid discharge system according to any of the preceding claims 128 – 130 and wherein said at least one location includes at least one of the following locations:

front vehicle windshield, back vehicle windshield, side vehicle windows, vehicle headlights, vehicle rear lights and vehicle exterior mirrors.

132. A heated liquid discharge system according to any of the preceding claims 128 - 131 and wherein a vehicle operator actuation switch is electrically coupled to said main assembly.

133. A heated liquid discharge system according to any of the preceding claims 128 - 132 and wherein said main assembly is connected to a vehicle computer.

134. A heated liquid discharge system according to any of the preceding claims 128 - 133 and wherein said main assembly is connected to a vehicle ignition switch.

135. A heated liquid discharge system according to any of the preceding claims 128 - 134 and wherein said main assembly comprises a principal housing portion and a cover housing portion.

136. A heated liquid discharge system according to claim 135 and wherein said principal housing portion defines a generally circular cylindrical liquid heating

chamber accommodating volume in a major portion of which is disposed a liquid heating assembly including said liquid heating chamber.

137. A heated liquid discharge system according to any of the preceding claims 128 - 136 and wherein said liquid heating chamber comprises a generally circular cylindrical outer sleeve.

138. A heated liquid discharge system according to any of the preceding claims 128 - 137 and wherein said liquid heating assembly comprises a plurality of heating elements located within said liquid heating chamber.

139. A heated liquid discharge system according to claim 138 and wherein electrical characteristics of individual ones of said plurality of heating elements are different from each other.

140. A heated liquid discharge system according to claim 136 and wherein said principal housing portion defines a liquid inlet channel and a heated liquid outlet channel, both communicating with said liquid heating chamber accommodating volume and respectively communicating with said liquid inflow conduit and said liquid outflow conduit.

141. A heated liquid discharge system according to claim 140 and wherein said principal housing portion also defines a heated liquid temperature sensor mounting aperture which communicates with said liquid heating chamber accommodating volume.

142. A heated liquid discharge system according to claim 141 and wherein liquid supplied to said liquid heating chamber accommodating volume via said liquid inlet channel enters said liquid heating chamber via at least two liquid inlet apertures formed in said liquid heating chamber including a first aperture located near a base of said liquid heating chamber and a second aperture located at an opposite side of said

liquid heating chamber from said first aperture and near a middle of a height of said liquid heating chamber.

143. A heated liquid discharge system according to claim 142 and wherein during operation of said vehicle pump supplying liquid to said liquid inflow conduit a level of said liquid exceeds said height of said liquid heating chamber and fills said liquid heating chamber accommodating volume.

144. A heated liquid discharge system according to claim 143 and wherein said liquid drain aperture is located on a side of said liquid heating chamber just below the top thereof, which permits draining of said liquid from said liquid heating chamber accommodating volume generally only down to said level of said liquid drain aperture when said vehicle pump is not in operation.

145. A heated liquid discharge system according to claim 144 and wherein said liquid from said liquid reservoir is supplied by said vehicle pump via said liquid inlet conduit via a liquid inlet pathway portion of a liquid connector assembly, which also defines a liquid outlet pathway portion.

146. A heated liquid discharge system according to claim 145 and wherein said liquid connector assembly defines a differential pressure bypass pathway portion, which is controlled by a one-way valve and which permits liquid flow from said liquid inlet pathway portion to said liquid outlet pathway portion when a pressure differential thereacross reaches a predetermined threshold, which indicates the existence of a blockage in a liquid path through said liquid heating chamber accommodating volume.

147. A heated liquid discharge system according to claim 146 and wherein said liquid inlet pathway portion comprises a leaky one way valve which permits supply of liquid under pressure to said liquid heating chamber accommodating volume but restricts backflow therethrough to a relatively slow rate.

148. A heated liquid discharge system according to claim 147 and wherein said liquid passes through said liquid inlet channel, fills said liquid heating chamber accommodating volume and flows into said liquid heating chamber via said first and second apertures.

149. A heated liquid discharge system according to claim 148 and wherein said liquid is heated in said liquid heating chamber and a temperature of said liquid or of air overlying said liquid, depending on the liquid level of said liquid, is sensed by at least one temperature sensor.

150. A heated liquid discharge system according to claim 149 and wherein said at least one temperature sensor is mounted onto a printed circuit board which is mounted within said principal housing portion and located outside of said liquid heating chamber accommodating volume.

151. A heated liquid discharge system according to any of the preceding claims 128 - 150 and also comprising control circuitry, for operation of said main assembly, which is connected to said at least one temperature sensor.

152. A heated liquid discharge system according to any of the preceding claims 128 - 151 and also comprising an overheating cut-off fuse for shutting off electrical power to at least part of said main assembly in the event of overheating of said liquid heating chamber.

153. A heated liquid discharge system according to claim 152 and wherein said fuse is formed with an undersurface of a resilient material and is retained in tight thermal engagement with the underside of a base of said liquid heating element.

154. A heated liquid discharge system according to any of the preceding claims 128 - 153 and wherein said liquid drain aperture together with said leaky one-way valve provides both overheating and anti-freezing protection for said main assembly.

155. A heated liquid discharge system according to claim 154 and wherein when said liquid is not being pumped into said liquid heating chamber, said liquid tends to drain slowly from said liquid heating chamber via said leaky one-way valve until a level of liquid in said liquid heating chamber reaches said level of said liquid drain aperture, at which point air, rather than liquid is drawn into said liquid outflow conduit, effectively terminating drainage and retaining liquid inside said liquid heating chamber accommodating volume generally at said level of said liquid drain aperture.

156. A heated liquid discharge system according to claim 155 and wherein retention of liquid inside said liquid heating chamber at a level generally not lower than that of said liquid drain aperture ensures that said level of liquid in said liquid heating chamber at least covers most of said heating elements located therein, ensuring rapid heating of said liquid and avoiding burning out of said heating elements due to lack of said liquid in the vicinity thereof and retention of said liquid inside said liquid heating chamber at a level no higher than that of said liquid drain aperture ensures that sufficient freezing expansion volume is provided so that when the vehicle is not being operated and is in a freezing environment, freezing of said liquid therein does not cause cracking of said liquid heating chamber.

157. A heated liquid discharge system comprising:

a main assembly which provides liquid heating and includes electrical and liquid flow control functionalities;

a liquid inflow conduit supplying liquid from a liquid reservoir to said main assembly; and

a liquid outflow conduit supplying liquid to at least one sprayer located at at least one location on a motor vehicle,

said main assembly comprising a liquid heating chamber and an electrical circuit board having mounted thereon a liquid temperature sensor which senses temperature of said liquid in said liquid heating chamber.

158. A heated liquid discharge system according to claim 157 and wherein said main assembly comprises a liquid heating chamber communicating with said liquid inflow conduit and said liquid outflow conduit and being formed with a liquid drain aperture located on a side thereof which permits draining of liquid from said liquid heating chamber generally down to level of said liquid drain aperture via said leaky one-way valve.

159. A heated liquid discharge system according to claim 158 and wherein said draining takes place when a vehicle pump supplying liquid to said liquid inflow conduit is not in operation.

160. A heated liquid discharge system according to any of the preceding claims 157 – 159 and wherein said at least one location includes at least one of the following locations:

front vehicle windshield, back vehicle windshield, side vehicle windows, vehicle headlights, vehicle rear lights and vehicle exterior mirrors.

161. A heated liquid discharge system according to any of the preceding claims 157 - 160 and wherein a vehicle operator actuation switch is electrically coupled to said main assembly.

162. A heated liquid discharge system according to any of the preceding claims 157 - 161 and wherein said main assembly is connected to a vehicle computer.

163. A heated liquid discharge system according to any of the preceding claims 157 - 162 and wherein said main assembly is connected to a vehicle ignition switch.

164. A heated liquid discharge system according to any of the preceding claims 157 - 163 and wherein said main assembly comprises a principal housing portion and a cover housing portion.

165. A heated liquid discharge system according to claim 164 and wherein said principal housing portion defines a generally circular cylindrical liquid heating chamber accommodating volume in a major portion of which is disposed a liquid heating assembly including said liquid heating chamber.

166. A heated liquid discharge system according to any of the preceding claims 157 - 165 and wherein said liquid heating chamber comprises a generally circular cylindrical outer sleeve.

167. A heated liquid discharge system according to any of the preceding claims 157 - 166 and wherein said liquid heating assembly comprises a plurality of heating elements located within said liquid heating chamber.

168. A heated liquid discharge system according to claim 167 and wherein electrical characteristics of individual ones of said plurality of heating elements are different from each other.

169. A heated liquid discharge system according to claim 165 and wherein said principal housing portion defines a liquid inlet channel and a heated liquid outlet channel, both communicating with said liquid heating chamber accommodating volume and respectively communicating with said liquid inflow conduit and said liquid outflow conduit.

170. A heated liquid discharge system according to claim 169 and wherein said principal housing portion also defines a heated liquid temperature sensor mounting aperture which communicates with said liquid heating chamber accommodating volume.

171. A heated liquid discharge system according to claim 170 and wherein liquid supplied to said liquid heating chamber accommodating volume via said liquid inlet channel enters said liquid heating chamber via at least two liquid inlet apertures formed in said liquid heating chamber including a first aperture located near a base of

said liquid heating chamber and a second aperture located at an opposite side of said liquid heating chamber from said first aperture and near a middle of a height of said liquid heating chamber.

172. A heated liquid discharge system according to claim 171 and wherein during operation of said vehicle pump supplying liquid to said liquid inflow conduit a level of said liquid exceeds said height of said liquid heating chamber and fills said liquid heating chamber accommodating volume.

173. A heated liquid discharge system according to claim 172 and wherein said liquid drain aperture is located on a side of said liquid heating chamber just below the top thereof, which permits draining of said liquid from said liquid heating chamber accommodating volume generally only down to said level of said liquid drain aperture when said vehicle pump is not in operation.

174. A heated liquid discharge system according to claim 173 and wherein said liquid from said liquid reservoir is supplied by said vehicle pump via said liquid inlet conduit via a liquid inlet pathway portion of a liquid connector assembly, which also defines a liquid outlet pathway portion.

175. A heated liquid discharge system according to claim 174 and wherein said liquid connector assembly defines a differential pressure bypass pathway portion, which is controlled by a one-way valve and which permits liquid flow from said liquid inlet pathway portion to said liquid outlet pathway portion when a pressure differential thereacross reaches a predetermined threshold, which indicates the existence of a blockage in a liquid path through said liquid heating chamber accommodating volume.

176. A heated liquid discharge system according to claim 175 and wherein said liquid inlet pathway portion comprises a leaky one way valve which permits supply of liquid under pressure to said liquid heating chamber accommodating volume but restricts backflow therethrough to a relatively slow rate.

177. A heated liquid discharge system according to claim 176 and wherein said liquid passes through said liquid inlet channel, fills said liquid heating chamber accommodating volume and flows into said liquid heating chamber via said first and second apertures.

178. A heated liquid discharge system according to claim 177 and wherein said liquid is heated in said liquid heating chamber and a temperature of said liquid or of air overlying said liquid, depending on the liquid level of said liquid, is sensed by said liquid temperature sensor.

179. A heated liquid discharge system according to claim 158 and wherein said at liquid temperature sensor is mounted onto a printed circuit board which is mounted within said principal housing portion and located outside of said liquid heating chamber accommodating volume.

180. A heated liquid discharge system according to any of the preceding claims 157 - 179 and also comprising control circuitry, for operation of said main assembly, which is connected to said liquid temperature sensor.

181. A heated liquid discharge system according to any of the preceding claims 157 - 180 and also comprising an overheating cut-off fuse for shutting off electrical power to at least part of said main assembly in the event of overheating of said liquid heating chamber.

182. A heated liquid discharge system according to claim 181 and wherein said fuse is formed with an undersurface of a resilient material and is retained in tight thermal engagement with the underside of a base of said liquid heating element.

183. A heated liquid discharge system according to any of the preceding claims 157 - 182 and wherein said liquid drain aperture together with said leaky one-way valve provides both overheating and anti-freezing protection for said main assembly.

184. A heated liquid discharge system according to claim 183 and wherein when said liquid is not being pumped into said liquid heating chamber, said liquid tends to drain slowly from said liquid heating chamber via said leaky one-way valve until a level of liquid in said liquid heating chamber reaches said level of said liquid drain aperture, at which point air, rather than liquid is drawn into said liquid outflow conduit, effectively terminating drainage and retaining liquid inside said liquid heating chamber accommodating volume generally at said level of said liquid drain aperture.

185. A heated liquid discharge system according to claim 184 and wherein retention of liquid inside said liquid heating chamber at a level generally not lower than that of said liquid drain aperture ensures that said level of liquid in said liquid heating chamber at least covers most of said heating elements located therein, ensuring rapid heating of said liquid and avoiding burning out of said heating elements due to lack of said liquid in the vicinity thereof and retention of said liquid inside said liquid heating chamber at a level no higher than that of said liquid drain aperture ensures that sufficient freezing expansion volume is provided so that when the vehicle is not being operated and is in a freezing environment, freezing of said liquid therein does not cause cracking of said liquid heating chamber.

186. A heated liquid discharge method comprising:

supplying liquid from a liquid reservoir to a liquid heating chamber comprised in a main assembly ;

heating said liquid in said liquid heating chamber;

supplying heated liquid from said liquid heating chamber to at least one sprayer located at at least one location on a motor vehicle; and

draining of liquid to said liquid reservoir from said liquid heating chamber generally down to a predetermined level in said liquid heating chamber.

187. A heated liquid discharge method according to claim 186 and wherein said supplying liquid from a liquid reservoir to a liquid heating chamber is via a liquid inflow conduit and said supplying heated liquid from said liquid heating chamber to

said at least one sprayer located at at least one location on a motor vehicle is via a liquid outflow conduit.

188. A heated liquid discharge method according to claim 186 or claim 187 and wherein said draining is via a liquid drain aperture located on a side of said liquid heating chamber.

189. A heated liquid discharge method according to claim 188 and wherein said draining takes place when a vehicle pump supplying liquid to said liquid inflow conduit is not in operation.

190. A heated liquid discharge method according to claim 186 and wherein said at least one location includes at least one of the following locations:

front vehicle windshield, back vehicle windshield, side vehicle windows vehicle headlights, vehicle rear lights and vehicle exterior mirrors.

191. A heated liquid discharge method according to any of the preceding claims 186 - 190 and also comprising electrically coupling a vehicle operator actuation switch to said main assembly.

192. A heated liquid discharge method according to any of the preceding claims 186 - 191 and also comprising connecting said main assembly to a vehicle computer.

193. A heated liquid discharge method according to any of the preceding claims 186 - 192 and also comprising connecting said main assembly to a vehicle ignition switch.

194. A heated liquid discharge method according to any of the preceding claims 186 - 193 and wherein said heating said liquid in said liquid heating chamber is provided by a plurality of heating elements located within said liquid heating chamber.

195. A heated liquid discharge method according to claim 194 and wherein electrical characteristics of individual ones of said plurality of heating elements are different from each other.

196. A heated liquid discharge method according to claim 186 and wherein said liquid flows to said liquid heating chamber via a liquid inlet channel and enters said liquid heating chamber via at least two liquid inlet apertures formed in said liquid heating chamber including a first aperture located near a base of said liquid heating chamber and a second aperture located at an opposite side of said liquid heating chamber from said first aperture and near a middle of a height of said liquid heating chamber.

197. A heated liquid discharge method according to claim 196 and wherein during operation of said vehicle pump supplying liquid to said liquid inflow conduit a level of said liquid exceeds said height of said liquid heating chamber and fills a liquid heating chamber accommodating volume defined within said liquid heating chamber.

198. A heated liquid discharge method according to claim 197 and wherein said liquid drain aperture is located on a side of said liquid heating chamber just below the top thereof, which permits said draining of said liquid from said liquid heating chamber accommodating volume generally only down to said level of said liquid drain aperture when said vehicle pump is not in operation.

199. A heated liquid discharge method according to claim 198 and wherein said liquid from said liquid reservoir is supplied by said vehicle pump via said liquid inlet conduit via a liquid inlet pathway portion of a liquid connector assembly, which also defines a liquid outlet pathway portion.

200. A heated liquid discharge method according to claim 199 and also comprising controlling a differential pressure bypass pathway portion defined within a liquid connector assembly by a one-way valve, said one-way valve permits liquid flow from said liquid inlet pathway portion to said liquid outlet pathway portion when a

pressure differential thereacross reaches a predetermined threshold, which indicates the existence of a blockage in a liquid path through said liquid heating chamber accommodating volume.

201. A heated liquid discharge method according to claim 200 and also comprising permitting supply of liquid under pressure to said liquid heating chamber accommodating volume but restricting backflow therethrough to a relatively slow rate.

202. A heated liquid discharge method according to claim 196 and wherein said liquid passes through said liquid inlet channel, fills said liquid heating chamber accommodating volume and flows into said liquid heating chamber via said first and second apertures.

203. A heated liquid discharge method according to any of the preceding claims 186 – 202 and also comprising sensing a temperature of said liquid in said liquid heating chamber or of air overlying said liquid, depending on the liquid level of said liquid, by at least one temperature sensor.

204. A heated liquid discharge method according to claim 203 and also comprising operating said main assembly by a control circuitry, for operation of said main assembly, which is connected to said at least one temperature sensor.

205. A heated liquid discharge method according to any of the preceding claims 186 - 204 and also comprising shutting off electrical power to at least part of said main assembly in the event of overheating of said liquid heating chamber by an overheating cut-off fuse.

206. A heated liquid discharge method according to claim 205 and wherein said fuse is formed with an undersurface of a resilient material and is retained in tight thermal engagement with the underside of a base of said liquid heating element.

207. A heated liquid discharge method according to any of the preceding claims 197 - 206 and also comprising providing both overheating and anti-freezing protection for said main assembly by said liquid drain aperture together with a leaky one-way valve.

208. A heated liquid discharge method according to claim 207 and wherein when said liquid is not being pumped into said liquid heating chamber, said liquid tends to drain slowly from said liquid heating chamber via said leaky one-way valve until a level of liquid in said liquid heating chamber reaches a level of said liquid drain aperture, at which point air, rather than liquid is drawn into said liquid outflow conduit, effectively terminating drainage and retaining liquid inside said liquid heating chamber accommodating volume generally at said level of said liquid drain aperture.

209. A heated liquid discharge method according to claim 208 and wherein retention of liquid inside said liquid heating chamber at a level generally not lower than that of said liquid drain aperture ensures that said level of liquid in said liquid heating chamber at least covers most of said heating elements located therein, ensuring rapid heating of said liquid and avoiding burning out of said heating elements due to lack of said liquid in the vicinity thereof and retention of said liquid inside said liquid heating chamber at a level no higher than that of said liquid drain aperture ensures that sufficient freezing expansion volume is provided so that when the vehicle is not being operated and is in a freezing environment, freezing of said liquid therein does not cause cracking of said liquid heating chamber.

210. A heated liquid discharge method comprising:

supplying liquid from a liquid reservoir to a liquid heating chamber;

heating said liquid in said liquid heating chamber;

supplying heated liquid from said liquid heating chamber to at least one sprayer located at at least one location on a motor vehicle; and

draining of liquid to said liquid reservoir from said liquid heating chamber via a leaky one-way valve.

211. A heated liquid discharge method according to claim 210 and wherein said supplying liquid from a liquid reservoir to a liquid heating chamber is via a liquid inflow conduit and said supplying heated liquid from said liquid heating chamber to said at least one sprayer located at at least one location on a motor vehicle is via a liquid outflow conduit.

212. A heated liquid discharge method according to claim 210 or claim 211 and wherein said draining is via a liquid drain aperture located on a side of said liquid heating chamber.

213. A heated liquid discharge method according to claim 212 and wherein said draining takes place when a vehicle pump supplying liquid to said liquid inflow conduit is not in operation.

214. A heated liquid discharge method according to any of the preceding claims 210 - 213 and wherein said at least one location includes at least one of the following locations:

front vehicle windshield, back vehicle windshield, side vehicle windows, vehicle headlights, vehicle rear lights and vehicle exterior mirrors.

215. A heated liquid discharge method according to any of the preceding claims 210 - 214 and also comprising electrically coupling a vehicle operator actuation switch to said main assembly.

216. A heated liquid discharge method according to any of the preceding claims 210 - 215 and also comprising connecting said main assembly to a vehicle computer.

217. A heated liquid discharge method according to any of the preceding claims 210 - 216 and also comprising connecting said main assembly to a vehicle ignition switch.

218. A heated liquid discharge method according to any of the preceding claims 210 - 217 and wherein said heating said liquid in said liquid heating chamber is provided by a plurality of heating elements located within said liquid heating chamber.

219. A heated liquid discharge method according to claim 218 and wherein electrical characteristics of individual ones of said plurality of heating elements are different from each other.

220. A heated liquid discharge method according to claim 210 and wherein said liquid flows to said liquid heating chamber via a liquid inlet channel and enters said liquid heating chamber via at least two liquid inlet apertures formed in said liquid heating chamber including a first aperture located near a base of said liquid heating chamber and a second aperture located at an opposite side of said liquid heating chamber from said first aperture and near a middle of a height of said liquid heating chamber.

221. A heated liquid discharge method according to claim 220 and wherein during operation of said vehicle pump supplying liquid to said liquid inflow conduit a level of said liquid exceeds said height of said liquid heating chamber and fills a liquid heating chamber accommodating volume defined within said liquid heating chamber.

222. A heated liquid discharge method according to claim 221 and wherein said liquid drain aperture is located on a side of said liquid heating chamber just below the top thereof, which permits said draining of said liquid from said liquid heating chamber accommodating volume generally only down to said level of said liquid drain aperture when said vehicle pump is not in operation.

223. A heated liquid discharge method according to claim 222 and wherein said liquid from said liquid reservoir is supplied by said vehicle pump via said liquid inlet conduit via a liquid inlet pathway portion of a liquid connector assembly, which also defines a liquid outlet pathway portion.

224. A heated liquid discharge method according to claim 223 and also comprising controlling a differential pressure bypass pathway portion defined within a liquid connector assembly by a one-way valve, said one-way valve permits liquid flow from said liquid inlet pathway portion to said liquid outlet pathway portion when a pressure differential thereacross reaches a predetermined threshold, which indicates the existence of a blockage in a liquid path through said liquid heating chamber accommodating volume.

225. A heated liquid discharge method according to claim 224 and also comprising permitting supply of liquid under pressure to said liquid heating chamber accommodating volume but restricting backflow therethrough to a relatively slow rate.

226. A heated liquid discharge method according to claim 220 and wherein said liquid passes through said liquid inlet channel, fills said liquid heating chamber accommodating volume and flows into said liquid heating chamber via said first and second apertures.

227. A heated liquid discharge method according to any of the preceding claims 210 – 226 and also comprising sensing a temperature of said liquid in said liquid heating chamber or of air overlying said liquid, depending on the liquid level of said liquid, by at least one temperature sensor.

228. A heated liquid discharge method according to claim 227 and also comprising operating said main assembly by a control circuitry, for operation of said main assembly, which is connected to said at least one temperature sensor.

229. A heated liquid discharge method according to any of the preceding claims 210 - 228 and also comprising shutting off electrical power to at least part of said main assembly in the event of overheating of said liquid heating chamber by an overheating cut-off fuse.

230. A heated liquid discharge method according to claim 229 and wherein said fuse is formed with an undersurface of a resilient material and is retained in tight thermal engagement with the underside of a base of said liquid heating element.

231. A heated liquid discharge method according to any of the preceding claims 212 - 230 and also comprising providing both overheating and anti-freezing protection for said main assembly by said liquid drain aperture together with said leaky one-way valve.

232. A heated liquid discharge method according to claim 231 and wherein when said liquid is not being pumped into said liquid heating chamber, said liquid tends to drain slowly from said liquid heating chamber via said leaky one-way valve until a level of liquid in said liquid heating chamber reaches a level of said liquid drain aperture, at which point air, rather than liquid is drawn into said liquid outflow conduit, effectively terminating drainage and retaining liquid inside said liquid heating chamber accommodating volume generally at said level of said liquid drain aperture.

233. A heated liquid discharge method according to claim 232 and wherein retention of liquid inside said liquid heating chamber at a level generally not lower than that of said liquid drain aperture ensures that said level of liquid in said liquid heating chamber at least covers most of said heating elements located therein, ensuring rapid heating of said liquid and avoiding burning out of said heating elements due to lack of said liquid in the vicinity thereof and retention of said liquid inside said liquid heating chamber at a level no higher than that of said liquid drain aperture ensures that sufficient freezing expansion volume is provided so that when the vehicle is not being operated and is in a freezing environment, freezing of said liquid therein does not cause cracking of said liquid heating chamber.

234. A heated liquid discharge method according to claim 210 and wherein said draining of liquid to said liquid reservoir from said liquid heating chamber takes place generally down to a predetermined level in said liquid heating chamber.

235. A heated liquid discharge method comprising:

supplying liquid from a liquid reservoir to a liquid heating chamber;

heating said liquid in said liquid heating chamber;

supplying heated liquid from said liquid heating chamber to at least one sprayer located at at least one location on a motor vehicle;

sensing a temperature of said heated liquid; and separately

sensing a temperature of said liquid heating chamber.

236. A heated liquid discharge method according to claim 235 and also comprising draining of said liquid to said liquid reservoir from said liquid heating chamber generally down to a predetermined level in said liquid heating chamber.

237. A heated liquid discharge method according to claim 235 or claim 236 and wherein said supplying liquid from a liquid reservoir to a liquid heating chamber is via a liquid inflow conduit and said supplying heated liquid from said liquid heating chamber to said at least one sprayer located at at least one location on a motor vehicle is via a liquid outflow conduit.

238. A heated liquid discharge method according to claim 237 and wherein said draining is via a liquid drain aperture located on a side of said liquid heating chamber.

239. A heated liquid discharge method according to claim 238 and wherein said draining takes place when a vehicle pump supplying liquid to said liquid inflow conduit is not in operation.

240. A heated liquid discharge method according to any of the preceding claims 235 - 239 and wherein said at least one location includes at least one of the following locations:

front vehicle windshield, back vehicle windshield, side vehicle windows vehicle headlights, vehicle rear lights and vehicle exterior mirrors.

241. A heated liquid discharge method according to any of the preceding claims 235 - 240 and also comprising electrically coupling a vehicle operator actuation switch to said main assembly.

242. A heated liquid discharge method according to any of the preceding claims 235 - 241 and also comprising connecting said main assembly to a vehicle computer.

243. A heated liquid discharge method according to any of the preceding claims 235 - 242 and also comprising connecting said main assembly to a vehicle ignition switch.

244. A heated liquid discharge method according to any of the preceding claims 235 - 243 and wherein said heating said liquid in said liquid heating chamber is provided by a plurality of heating elements located within said liquid heating chamber.

245. A heated liquid discharge method according to claim 244 and wherein electrical characteristics of individual ones of said plurality of heating elements are different from each other.

246. A heated liquid discharge method according to claim 235 and wherein said liquid flows to said liquid heating chamber via a liquid inlet channel and enters said liquid heating chamber via at least two liquid inlet apertures formed in said liquid heating chamber including a first aperture located near a base of said liquid heating chamber and a second aperture located at an opposite side of said liquid heating chamber from said first aperture and near a middle of a height of said liquid heating chamber.

247. A heated liquid discharge method according to claim 246 and wherein during operation of said vehicle pump supplying liquid to said liquid inflow conduit a level of said liquid exceeds said height of said liquid heating chamber and fills a liquid heating chamber accommodating volume defined within said liquid heating chamber.

248. A heated liquid discharge method according to claim 247 and wherein said liquid drain aperture is located on a side of said liquid heating chamber just below the top thereof, which permits said draining of said liquid from said liquid heating chamber accommodating volume generally only down to said level of said liquid drain aperture when said vehicle pump is not in operation.

249. A heated liquid discharge method according to claim 248 and wherein said liquid from said liquid reservoir is supplied by said vehicle pump via said liquid inlet conduit via a liquid inlet pathway portion of a liquid connector assembly, which also defines a liquid outlet pathway portion.

250. A heated liquid discharge method according to claim 249 and also comprising controlling a differential pressure bypass pathway portion defined within a liquid connector assembly by a one-way valve, said one-way valve permits liquid flow from said liquid inlet pathway portion to said liquid outlet pathway portion when a pressure differential thereacross reaches a predetermined threshold, which indicates the existence of a blockage in a liquid path through said liquid heating chamber accommodating volume.

251. A heated liquid discharge method according to claim 250 and also comprising permitting supply of liquid under pressure to said liquid heating chamber accommodating volume but restricting backflow therethrough to a relatively slow rate.

252. A heated liquid discharge method according to claim 246 and wherein said liquid passes through said liquid inlet channel, fills said liquid heating chamber accommodating volume and flows into said liquid heating chamber via said first and second apertures.

253. A heated liquid discharge method according to any of the preceding claims 235 – 252 and wherein sensing a temperature of said liquid heating chamber or

of air overlying said liquid, depending on the liquid level of said liquid, by at least one temperature sensor.

254. A heated liquid discharge method according to claim 253 and also comprising operating said main assembly by a control circuitry, for operation of said main assembly, which is connected to said at least one temperature sensor.

255. A heated liquid discharge method according to any of the preceding claims 235 - 254 and also comprising shutting off electrical power to at least part of said main assembly in the event of overheating of said liquid heating chamber by an overheating cut-off fuse.

256. A heated liquid discharge method according to claim 255 and wherein said fuse is formed with an undersurface of a resilient material and is retained in tight thermal engagement with the underside of a base of said liquid heating element.

257. A heated liquid discharge method according to any of the preceding claims 238 - 256 and also comprising providing both overheating and anti-freezing protection for said main assembly by said liquid drain aperture together with a leaky one-way valve.

258. A heated liquid discharge method according to claim 257 and wherein when said liquid is not being pumped into said liquid heating chamber, said liquid tends to drain slowly from said liquid heating chamber via said leaky one-way valve until a level of liquid in said liquid heating chamber reaches a level of said liquid drain aperture, at which point air, rather than liquid is drawn into said liquid outflow conduit, effectively terminating drainage and retaining liquid inside said liquid heating chamber accommodating volume generally at said level of said liquid drain aperture.

259. A heated liquid discharge method according to claim 258 and wherein retention of liquid inside said liquid heating chamber at a level generally not lower than that of said liquid drain aperture ensures that said level of liquid in said liquid heating

chamber at least covers most of said heating elements located therein, ensuring rapid heating of said liquid and avoiding burning out of said heating elements due to lack of said liquid in the vicinity thereof and retention of said liquid inside said liquid heating chamber at a level no higher than that of said liquid drain aperture ensures that sufficient freezing expansion volume is provided so that when the vehicle is not being operated and is in a freezing environment, freezing of said liquid therein does not cause cracking of said liquid heating chamber.